

# Teachers' Digital Skills after Covid-19 in Public Senior High School

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ARTICLE INFO	ABSTRACT
<p><b>Received:</b> 16 January 2025</p> <p><b>Revised:</b> 13 February 2025</p> <p><b>Accepted:</b> 4 March 2025</p>	<p>The purpose of this study was to determine the description of digital skills owned by teachers and compare them based on school type. This research uses mixed method with The Explanatory Sequential Design type. This research uses purposive sampling technique. The sample of this research is a teacher at one of the schools selected based on the type of school, namely Senior high school, vocational school and Islamic Senior high school. Kruskal-Wallis test and Mann Whittney test were used to determine the differences in digital skills owned by teachers. The results showed that the digital skills possessed by teachers based on the type of school, namely Senior high school, vocational school and Islamic Senior high school. It is known that there are differences in digital skills possessed with a significance value &lt;0.05 significance level, namely 0.042. The digital skills possessed by teachers are included in the high and very high categories and when compared in each school it is known that there is no difference between the digital skills of vocational school and Senior high school, vocational school and Islamic Senior high school teachers. While between Senior high school and Islamic Senior high school. Teachers there are differences in their digital skills. Then in the qualitative analysis in the digital skill indicator section, the teacher has done very well in an effort to carry out his job as a teacher, but the aspects of Digital Content Creation and safety need to be improved.</p>
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## 1. INTRODUCTION

Pandemi Covid – 19 has caused inequality in digital usage (İnce, 2022). There are various forms of inability to use technology, namely the lack of costs in buying equipment, (Ayuningtyas, 2015), the absence of a network connection (Lestari, 2015), lack of motivation in utilizing technology (Mukaromah, 2020), and low digital skills (Van Dijk & Hacker, 2003). In the field of education, the pandemic has a very significant impact on learning, especially in the aspect of digital skills. Digital skills are a key aspect in the implementation of learning (Sailer et al., 2021). To achieve this, digital skills teachers are key in offering effective digital education at all levels. (Meinawati, 2022). However, many are unsettled by the current state of affairs due to a lack of knowledge and experience on how to plan, develop and deliver teaching through digital means, including identifying the most appropriate platforms and tools (Kwaah et al., 2022).

Educators can be said to be successful if they can make changes by adopting technology in learning so that the existence of technology or digital programs can overcome various problems. (König et al., 2020). However, in its implementation there are several obstacles, namely the fear of the results or use of digital to students, next is the issue of student data privacy and the last is the competence possessed to be able to adopt digital-based learning in the classroom. (Yurinova et al., 2022).



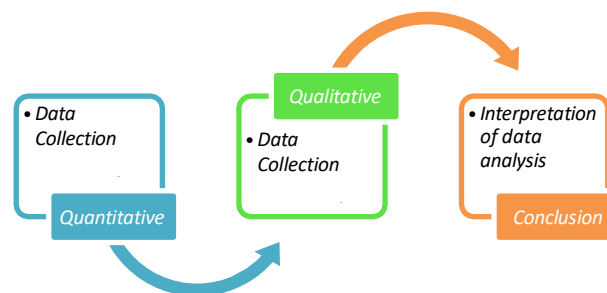
The use of digital technology in recent years by teachers shows an increasing frequency, this can be seen in the increase in participation in formal education and training that is followed in improving teacher digital skills in learning. this is very important because it prepares students to face the world of work after completing school. as we know the current challenge is that technological change has led to the need for the labor market to be able to use digital skills. (Shakina et al., 2021) in all its activities for that there is a need for a review of the relevance of the curriculum in order to deal with the lack of digital skills and increase training in the field of digital skills (Artacho et al., 2020).

Research conducted so far is to determine the ability of digital skills in students at the elementary school level. (Nafisa et al., 2017) Junior High School (Sari, 2019) Senior High School (Rosyadi et al., 2022) Teachers' digital skills during the pandemic (Perifanou et al., 2021) However, no measurement of teachers' digital skills has been carried out after the pandemic and based on the type of school, namely Senior high school, vocational school and Islamic Senior high school. For this reason, it is necessary to measure the extent of digital skills possessed by teachers after covid 19 based on school type in an effort to implement learning effectively. Digital skills themselves are divided into 5 categories, namely Information and Data Literacy, Communication and Collaboration, Digital Content Creation, Security, and Problem Solving. (Buckley & Pears, 2021; Iordache et al., 2017; Rakstu, 2021).

## 2. METHODS

This study used a mixed method research design through the Explanatory Sequential Design (Creswell & Creswell, 2018). The research design used quantitative methods as the first method and complement or strengthen the results of the research using qualitative methods. The design form of The Explanatory Sequential Design is as follows:

**Figure 1.** The Explanatory Sequential Design



Stage 1: At this stage, data collection is carried out using surveys and then the results are analyzed to plan or build the second stage.

Stage 2: At this stage, information is obtained to strengthen the data obtained in stage 1, which is quantitative by asking questions with interviews so that it can help explain the data in more detail.

The research population consisted of all research subjects, namely all senior high school, vocational school and Islamic Senior high school teachers in Jambi City, with total 46 schools. The schools were selected based on their types such as the senior, Islamic senior, and vocational schools in Jambi City. The basic selection of the sample is to compare schools with different types and based on the accreditation of each school so that when the comparison is expected to get the appropriate data. The number of teacher details at the school is as follows:

**Table 1.** Research Sample

School Name	Number of Teachers
Senior high school	46
Islamic Senior high school	34
vocational school	116

In this study using 2 instruments to determine the digital skills possessed by teachers, the first instrument used is a questionnaire, the questionnaire instrument is used to determine the digital skills of teachers and compare these digital skills by adopting from DigCompEdu. (Alessandro, 2018). The second instrument used is the interview. Interviews are used to explain in more detail based on the results of the analysis based on data acquisition.

In this research using mixed methods, there are two types of data analysis carried out, namely quantitative and qualitative data analysis.

Quantitative data analysis is intended to analyze the data that has been collected then so that it can be analyzed objectively in accordance with the research hypothesis that has been made. Data analysis is used using statistical techniques to determine differences between each variable or differences in the variables studied to test the research hypothesis. To analyze the data, Anova analysis was used (Fisher, 1990). However, if the data obtained is not normal and the number of samples is too small, the Kruskal-Wallis Test nonparametric statistical analysis will be used. (Kruskal & Wallis, 2012).

After analyzing the data quantitatively, the next step is to analyze qualitatively. The qualitative data is obtained based on interviews conducted in depth. Then to be presented, data reduction is carried out and conclusions are drawn. (Given, 2008).

### 3. FINDINGS

#### 3.1. Normality Test

The normality test is used to determine whether the data population is normally distributed or not. If the data is not normally distributed, the method used is nonparametric statistics. The basis for decision making is; 1) if the Sig. (significance) or probability value  $< 0.05$ , then the data is not normally distributed, 2) if the Sig value. (significance) or probability value  $> 0.05$ , then the data is normally distributed.

**Table 2.** Normality Test

School Type	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Senior high school	,116	7	,200*	,985	7	,979
vocational school	,192	20	,051	,885	20	,021
Islamic Senior high school	,189	7	,200*	,936	7	,603

Based on Table 2 shows that, the probability value (Sig.) with the Kolmogorov-Smirnov table for Digital Skill Senior high school is  $0.200 > 0.05$ , which means the data is normally distributed. At Digital Skill vocational school, the probability value (Sig.) obtained is  $0.051 > 0.05$ , which means the data is normally distributed. While at Digital Skill Islamic Senior high school the probability

value (Sig.) obtained is  $0.200 > 0.05$ , which means the data is normally distributed. The overall result of the normality test is that the data is normally distributed.

### 3.2. Homogeneity Test

The homogeneity test is used to determine whether the variants of several populations are the same or not. The basis for decision making is; 1) if the Sig. (significance) or probability value  $< 0.05$ , then it is said that the variants of two or more groups of population data are not the same, 2) if the Sig value. (significance) or probability value  $> 0.05$ , then it is said that the variants of two or more groups of data populations are the same.

**Table 3.** Homogeneity Test

		Levene Statistic	df1	df2	Sig.
Digital Skills	Based on Mean	2,256	2	35	,120
	Based on Median	2,225	2	35	,123
	Based on Median and with adjusted df	2,225	2	28	,127
	Based on trimmed mean	2,220	2	35	,124

Based on Table 3 shows that, the probability value (Sig.) based on mean is obtained  $0.270 > 0.05$ , which means the data has the same variance (homogeneous). The conclusion that can be drawn from the normality and homogeneity tests is that the data is normally distributed and has the same variance (homogeneous).

## 4. DISCUSSION

The data in this study were taken from the Digital Skill teacher questionnaire data distributed to 3 schools, namely at Senior high school, vocational school and Islamic Senior high school. However, after being distributed, only 9 teacher filled out the questionnaire at Senior high school, 7 teacher at Islamic Senior high school and 22 teacher at vocational school. The digital skill dimensions used are 1) Information and data literacy 2) Online communication and collaboration 3) Digital content creation 4) Safety 5) Problem solving. The description of the data based on the research results is as follows:

**Table 4.** Description Data

Indicator	School Type	Min	Max	Range	Mean	Std
Information and data literacy	Senior high school	7	9	2	8	0.6
	vocational school	7	10	3	9	0.9
	Islamic Senior high school	8	10	2	9	1.0
Online Communication and collaboration	Senior high school	8	9	1	8	0.5
	vocational school	7	10	3	8	0.8

	<b>Indicator</b>	<b>School Type</b>	<b>Min</b>	<b>Max</b>	<b>Range</b>	<b>Mean</b>	<b>Std</b>
Digital Skill Teacher		Islamic Senior high school	8	10	2	9	0.9
	Digital Content Creation	Senior high school	7	8	1	7	0.4
		vocational school	5	10	5	8	1.0
		Islamic Senior high school	5	10	5	8	1.7
	Safety	Senior high school	8	9	1	8	0.4
		vocational school	3	10	7	8	1.4
		Islamic Senior high school	8	10	2	9	0.9
	Problem Solving	Senior high school	7	8	1	8	0.3
		vocational school	7	10	3	8	1.0
		Islamic Senior high school	8	10	2	9	0.8

It can be seen in table 4 that the Digital Skills owned by teachers are included in the good category. These Digital skills include Information and data literacy which is owned on average in Senior high school is 8, in vocational school is 9, and in vocational school is 9. Online communication and collaboration on average in Senior high school is 8, in Islamic Senior high school is 8, and in vocational school is 9, Digital content creation owned on average in Senior high school is 7, in Islamic Senior high school is 8, and in vocational school is 8, Safety owned on average in Senior high school is 8, in Islamic Senior high school is 8, and in vocational school is 9, Problem solving owned on average in Senior high school is 8, in Islamic Senior high school is 8, and in vocational school is 9.

**Table 5.** Digital Skill Categories

	<b>Indicator</b>	<b>School Type</b>	<b>Category</b>	<b>%</b>
Digital Skill Teacher	Information and data literacy	Senior high school	High	60%
		vocational school	Very High	64%
		Islamic Senior high school	Very High	71%
	Online Communication and collaboration	Senior high school	Very High	100%
		vocational school	Very High	100%
		Islamic Senior high school	Very High	100%
	Digital Content Creation	Senior high school	High	55%
		vocational school	High	50%
		Islamic Senior high school	Very high	71%

	Safety	Senior high school	High	100%
		vocational school	High	64%
		Islamic Senior high school	Very High	57%
	Problem Solving	Senior high school	High	89%
		vocational school	High	50%
		Islamic Senior high school	High	72%

It can be seen in table 5 that the digital skills possessed by teachers are in the high and very high categories. Information and data literacy in Senior high school has high category with a percentage of 60%, in Islamic Senior high school has very high category with a percentage of 64%, in vocational school has very high category with a percentage of 71%, Online communication and collaboration in Senior high school has a very high category with a percentage of 100%, in Islamic Senior high school has a very high category with a percentage of 100%, in vocational school has a very high category with a percentage of 100%, Digital content creation in Senior high school has a high category with a percentage of 55%, Safety in Senior high school has a high category with a percentage of 100%, in Islamic Senior high school has a high category with a percentage of 64%, in vocational school has a very high category with a percentage of 57%, Problem solving in Senior high school has a high category with a percentage of 89%, in Islamic Senior high school has a high category with a percentage of 50%, in vocational school has a high category with a percentage of 72%.

Digital skills possessed by teachers in the aspects of communication and collaboration have a very high category value with a percentage of 100%, this means that teachers have used digital technology to share all information and collaborate to work together in achieving learning goals. However, what needs to be underlined is that in the aspect of Digital Content Creation, although it has high and very high category aspects, there is a minimum value in the low category, namely at a score of 5 at Islamic Senior high school and vocational school, meaning that there are some teachers who have not been able to utilize technology in order to support learning. and in terms of Safety there is a low minimum score, namely at a score of 3 at Islamic Senior high school, meaning that there are some teachers in utilizing technology who have not paid attention to Safety in using technology.

#### 4.1. Comparison of Digital Skills by School Type

The data in this study were taken from the Digital Skill teacher questionnaire data distributed to 3 schools, namely at Senior high school, vocational school and Islamic Senior high school. However, after being distributed, only 9 teacher filled out the questionnaire at Senior high school, 7 teacher at Islamic Senior high school and 22 teacher at vocational school. The digital skill dimensions used are 1) Information and data literacy 2) Online communication and collaboration 3) Digital content creation 4) Safety 5) Problem solving. Based on the normality and homogeneity test, the data is normally distributed and has the same variance (homogeneous). Due to the small amount of data or less than 30 samples, the hypothesis test uses the Kruskal-Wallis nonparametric test. The results of the Kruskal-Wallis test are as follows:

**Table 6.** Kruskal Wallis Test Results

	School	N	Mean Rank	p
Digital_Skills	Senior high school	7	23,71	,042
	vocational school	9	11,50	
	Islamic Senior high school	22	21,43	
	Total	38		

Based on table 6 above, it is known that the average score value of Digital skills possessed by teachers in vocational schools is higher than the Digital skills possessed by teachers in Islamic Senior high school schools and the average Digital skills possessed by teachers in Islamic Senior high schools are higher than the average ranking of high schools and based on the results of the Kruskal- Wallis test, the Asymp. Sig. is 0.042. Where the significance value is <0.05 significance level, then there is a significant difference in digital skills based on the type of school, namely Senior high school, vocational school and Islamic Senior high school.

#### 4.2. Comparison of Digital Skills of Vocational School and Senior High School Teachers

Based on the Kruskal-Wallis test, it is known that there are differences based on school type. However, to determine where the difference comes from the Mann Whittney test is used. Based on the Mann Whittney test in table 7, it is known that there is no difference in the digital skills possessed by teachers at Vocational School and Senior High School, namely with an Asymp. Sig. (2-tailed) or PValue of 0.090. The value of Asymp. Sig. (2- tailed) is more than 0.05. If the p value is more than the critical limit of 0.05, there is no significant difference between the digital skills of vocational and high school teachers.

**Table 7.** Mann Whittney Test Between Vocational School and Senior High School

	School	N	Mean Rank	Sum of Ranks	p
Digital_Skills	Vocational School	7	10,79	75,50	,090
	Senior High School	9	6,72	60,50	
	Total	16			

#### 4.3. Comparison of Digital Skills of Vocational School and Islamic Senior high School Teachers

Based on the Kruskal-Wallis test, it is known that there are differences based on school type. However, to determine where the difference comes from the Mann Whittney test is used. Based on the Mann Whittney test in table 8, it is known that there is no difference in digital skills possessed by teachers at Vocational School and Islamic Senior high School, namely with an Asymp. Sig. (2-tailed) or PValue of 0.490. The value of Asymp. Sig. (2- tailed) is more than 0.05. If the p value is more than the critical limit of 0.05, there is no significant difference between the digital skills of Vocational School and Islamic Senior high school teachers.

**Table 8.** Mann Whittney Test of Vocational School and Islamic Senior High School

	School	N	Mean Rank	Sum of Ranks	P
Digital_Skills	Vocational School	7	16,93	118,50	,490
	Islamic Senior high School	22	14,39	316,50	
	Total	29			

#### 4.4. Comparison of Digital Skills of Senior High School and Islamic Senior high School Teachers

Based on the Kruskal-Wallis test, it is known that there are differences based on school type. However, to determine where the difference comes from the Mann Whittney test is used. Based on the Mann Whittney test in table 9, it is known that there are differences in digital skills possessed by teachers in Senior High School and Islamic Senior high School, namely with the value of Asymp. Sig. (2-tailed) or PValue of 0.015. The value of Asymp. Sig. (2- tailed) is not more than 0.05. If the p-value is not more than the critical limit of 0.05, there is a significant difference between the digital skills of Senior High School and Islamic Senior high School teachers.

**Table 9.** Mann Whittney Test for Senior High School and Islamic Senior High School

	School	N	Mean Rank	Sum of Ranks	p
Digital_Skills	Senior High School	9	9,78	88,00	,015
	Islamic Senior high School	22	18,55	408,00	
	Total	31			

#### 4.5. Digital skill qualitative data: Information and data literacy

To find out the teacher's views on how to obtain data/information on the internet and the media used and how to filter the data so that the information obtained is verified, the interviewer asked the following questions "How do you/mother obtain data/information on the internet? What media are used? Then how do you filter the data so that you are sure that the information obtained is verified?"

Based on the results of interviews with the three research subjects, it can be seen that in the information acquisition and trustworthiness of the information obtained, the teachers in each school have been able to filter the information obtained properly. This is in line with the results of interviews conducted with vocational school teachers who said:

*"Open Google via smartphone. The existing data is adjusted to the teaching sub2, and retrieves the desired data and then develops it"*

Then added again by the teacher at Senior high school who said:

*"Search from various sources and when searching for data it must be on a clear web"*

From this information, it is known that teachers have been able to filter information by comparing various web information obtained to test its veracity. In addition, teachers have also been able to think critically to assess the information obtained. This is in accordance with what the Islamic Senior high school teacher said, he said:

*"Obtaining data on the internet is now very easy and practical, usually I will open a search engine such as Google or Chrome, enter the keywords I want to search for and then click search, the info we need will be seen on the monitor. To filter myself, I usually cross-check data from*

*other references as material for consideration, besides that I also check the validity of the data etc., other than that I also use critical thinking to assess whether this information is valid or not."*

#### **4.6. Digital Skill Qualitative Data: Online communication and Collaboration**

To find out the teachers' views on the use of technology in communication and teamwork, the interviewer asked the following questions "Do you use technology in teamwork? What forms of technology utilization to support teamwork?"

Based on the results of interviews with the three research subjects, it can be seen that the Online communication and Collaboration section has used technology to communicate with the team in completing tasks and collaborating through social media and existing media sharing. This is in line with the results of interviews conducted with vocational school teachers who said:

*"Every exam activity we use G-form, every time we teach we also use social media to support marketing materials such as Facebook, Instagram and Tik Tok".*

Then added again by the teacher at Senior high school who said:

*"Yes, for example by using applications in managing assessments"*

It is known from vocational school and Senior high school teachers that teachers use social media as a support in delivering material and use applications in terms of student assessment. In addition, MAN teachers use social media applications to communicate with fellow teachers and students in an effort to achieve learning goals and have used applications to collaborate in completing assignments. This is in accordance with what the Islamic Senior high school teacher said, he said:

*"Yes, using the WA application as a practical means of communication that can be done anywhere and anytime so as to facilitate communication while the signal is adequate. In addition, for work, we use google docs sharing, canva sharing applications and store data with the team on google drive, which in fact can be accessed by all teams."*

#### **4.7. Digital Skill Qualitative Data: Digital Content Creation**

To find out teachers' views on creating or developing technology-based content and products for learning. The interviewer asked the following question "Have you ever created or developed technology-based content or products What form does the content or product take?"

Based on the results of interviews with the three research subjects, it can be seen that the Digital content creation section has made digital content in the form of learning videos that are used when teaching. The use of learning videos is expected to support the achievement of learning objectives. This is in line with the results of interviews conducted with vocational school teachers who said:

*"I once made a learning video that I shared to YouTube and the merdeka Belajar application"*

The same thing was said by Senior high school teacher, namely:

*"Once, the content created was like a learning video"*

This is also corroborated by the Islamic Senior high school teacher as said as follows:

*"Once, made a digital video"*

#### **4.8. Digital Skill Qualitative Data: Safety**

To find out teachers' views on efforts to use technology to stay safe in terms of healthy use, personal data, device security and socially. The interviewer asked the following question "What do you do in an effort to use technology to keep it safe in terms of healthy use, personal data, device security and socially?"

Based on the results of interviews with the three research subjects, it can be seen that in the Safety section, teachers can already use technology safely by controlling the time of using technology and using safety devices from theft of personal data, virus attacks and other things in the use of technology socially. This is in line with the results of interviews conducted with vocational school teachers who said:

*"I use password security and 2-step verification".*

This was reinforced by the Senior high school teacher as said as follows:

*"Using technology moderately, getting enough rest, and using safety apps"*

It is known from vocational school and Senior high school teachers that teachers using technology have paid attention to safety from a physical and spiritual perspective. In addition, Islamic Senior high school teachers using technology have also used device security by using antivirus, on social accounts using 2-factor authentication, and setting permissions for updates etc. This is in accordance with what the Islamic Senior high school teacher said, he said:

*"Work is inseparable from digital technology, usually on my laptop I install antivirus, secure personal data by activating two-factor authentication to provide double security on google accounts, use original applications, set application permissions when there are updates etc."*

#### **4.9. Digital Skill Qualitative Data: Problem Solving**

To find out teachers' views on the use of technology in solving problems in their work. The interviewer asked the following question "What is the form of using technology in an effort to solve a problem in the work you do?"

Based on the results of interviews with the three research subjects, it can be seen that in the Problem-solving section, teachers have been able to utilize technology to support solving work problems by using web and online technology searches. This is in line with the results of interviews conducted with vocational school teachers who said:

*"In teaching, students use smartphones because they learn to market products online, in examinations they also use G-form, and the final assessment is currently using E-raport".*

This was reinforced by the Senior high school teacher as said as follows:

*"Web, learning applications and so on"*

The same thing was said by Islamic Senior high school teacher, namely:

*"When I get stuck on an idea, I look for references such as using Google and other online search technologies"*

From this information, it is known that teachers are able to use technology to complete their work well.

## 5. CONCLUSION

Digital skills possessed by teachers based on the type of school, namely Senior high school, vocational school and Islamic Senior high school, it is known that there are differences in digital skills possessed with a significance value  $<0.05$  significance level, namely 0.042. The digital skills possessed by teachers are included in the high and very high categories and continued with the Mann Whittney test it is known that there is no significant difference between the digital skills of vocational school and Senior high school teachers, there is no significant difference between the digital skills of vocational school and Islamic Senior high school teachers and there is a significant difference between the digital skills of Senior high school and Islamic Senior high school teachers. Then in the qualitative analysis in the digital skills indicator section, namely 1) Information and data literacy 2) Online communication and collaboration 3) Digital content creation 4) Safety 5) Problem solving has been done by teachers very well in an effort to carry out their work as teachers, but the aspects of Digital Content Creation and safety need to be improved.

As for further research, this study has not measured digital literacy based on the field of science in teachers, if referring to the field of science, of course there is a separate level of difficulty in digital utilization or digital skills in each teacher's field of science, for that in future research it is necessary to measure the ability of digital skills in teachers based on the field of science.

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